10 ME 42D   ROBOTICS
IV B.Tech II Semester
(with effect from the academic year 2013-2014)

Credits: 4
Lectures/week: 4 Hrs.   *Sessional Marks: 40*
University Exam:3 Hrs   *End Examination Marks: 60*

UNIT –I
Introduction – Basic components of a robotic systems- Classifications – SCARA – Robot motions – Specification characteristics of a robot- Spatial resolution, Accuracy, Repeatability, Work volume – Work volumes of different robot configurations.

UNIT-II
Robot Control System – Different types of controllers – On-Off, Proportional, Integral, Proportional and Derivative (PD), Proportional and Integral (PI) and PID Controllers – Open loop and closed loop control systems – Servo controlled and non-servo controlled robots. Drives – Hydraulic, Pneumatic and Electric drives.

UNIT-III
Trajectory Planning – cubic polynomials – Trajectory planning and robot controller. Robot sensors – types – Position, velocity, force, tactile, range, proximity sensors and their applications. Vision sensors and Robot/Machine vision – elements of machine vision. Robot grippers – types of end-effectors/grippers – mechanical grippers – force analysis.

UNIT-IV
Kinematic Analysis of Robots – DH matrix – HT of robot coordinate system – 2R and 3R robot manipulators. Introduction to robot dynamics.

UNIT-V
Robot programming. Applications of robot – Material handling, Machine loading/unloading, Assembly, Inspection etc., Robot Work cells. A case study – Robotization of an industrial operation. Safety aspect and Economic analysis.

TEXT BOOKS:
1. Industrial Robotics, Technology, Programming and Applications :
                                        Groover M.P., Weiss M. and Odrey N.G.
2. Robotics Technology and Flexible Automation : Deb S.K.

REFERENCES:
1. Introduction to Robotics, Mechanics and Control : John J.Craig.
2. Robot Manipulators: Mathematics, Programming and Control : Paul R.P.
3. Robotics and Industrial Automation : Rajput R.K